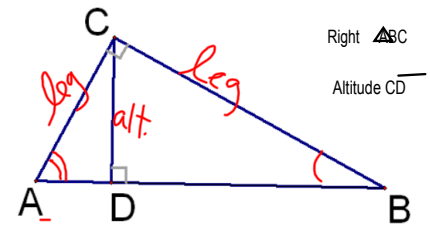
Chapter 7 Right Triangles and Trigonometry

7-1 Geometric Mean



Right $\triangle ABC$

Altitude $\overline{CD}$

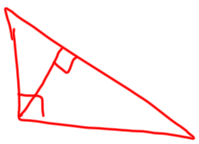
What are the similar triangles?

$\triangle ABC \sim \triangle ACD \sim \triangle CBD$

$\frac{AB}{AC} = \frac{BC}{CD} = \frac{AC}{AD}$ $\frac{AC}{CB} = \frac{CD}{BD} = \frac{AD}{CD}$

$\frac{AB}{CB} = \frac{BC}{BD} = \frac{AC}{CD}$

Theorem 7-1--If the altitude is drawn to the hypotenuse of a right triangle, then the 2 triangles formed are similar to each other and the original triangle.



Geometric Mean

$\frac{r}{s} = \frac{s}{t}$ s is the geometric mean

Find the geometric mean between 3 and 8.

$\frac{3}{g} = \frac{g}{8}$ $\sqrt{g^2} = \sqrt{24}$ $g = 2\sqrt{6}$

Find the geometric mean between 9 and 14.

$\frac{9}{x} = \frac{x}{14}$ $\sqrt{x^2} = \sqrt{9 \cdot 14}$ $x = 3\sqrt{14}$

Do:

1.Find the geometric mean between 5 and 10. $5\sqrt{2}$

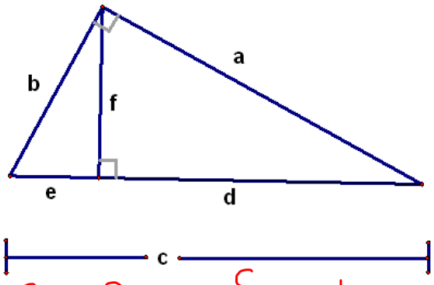
2.Find the geometric mean between 12 and 8. $4\sqrt{6}$

Theorem 7.2--....the altitude is the geometric mean b/w segments of hypotenuse

$\frac{e}{f} = \frac{f}{d}$

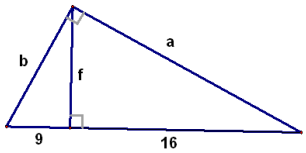
Theorem 7.3--....each leg is the geometric mean b/w the hypotenuse and the segment of the hypotenuse that is adjacent to the leg.

$\frac{c}{a} = \frac{a}{d}$ $\frac{c}{b} = \frac{b}{e}$



$\frac{e}{f} = \frac{f}{d}$ $\frac{c}{b} = \frac{b}{e}$ $\frac{c}{a} = \frac{a}{d}$

Example 1

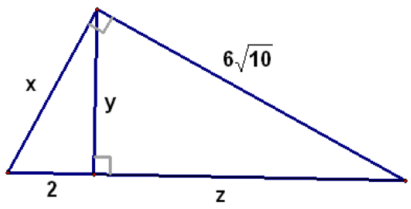


Find
a
b
c
f

$\frac{9}{f} = \frac{f}{16}$ $f^2 = 9 \cdot 16$ $f = 12$

$\frac{25}{a} = \frac{a}{16}$ $a^2 = 25 \cdot 16$ $a = 20$

$\frac{9}{b} = \frac{b}{25}$ $b^2 = 9 \cdot 25$ $b = 15$



$\frac{2}{y} = \frac{y}{z}$ $\frac{2}{x} = \frac{x}{2+z}$ $\frac{z}{6\sqrt{10}} = \frac{6\sqrt{10}}{2+z}$

$\frac{2}{y} = \frac{y}{18}$ $\frac{2}{x} = \frac{x}{20}$ $z(2+z) = 360$

$y^2 = 36$ $x^2 = 40$ $2z + z^2 = 360$

$y = 6$ $x = 2\sqrt{10}$ $z^2 + 2z - 360 = 0$

$(z - 18)(z + 20) = 0$

$z = 18$ $z \neq -20$

HW
p346
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